

## Article 52.--LOW PRESSURE HEATING BOILERS

**49-52-5 Safety valves.** (a) Each steam boiler shall have one or more ASME or national board-approved and certified safety valves of the spring pop-type adjusted and sealed to discharge at a pressure not to exceed 15 psig. Seals shall be attached in a manner that prevents the valve from being taken apart without breaking the seal. The safety valves shall be arranged so that they cannot be reset to relieve at a higher pressure than the maximum allowable working pressure of the boiler. A body drain connection below seat level shall be provided by the manufacturer, and this drain shall not be plugged during or after field installation. For valves exceeding two inches of pipe size, the drain hole or holes shall be tapped not less than 3/8 inch pipe size. For valves less than two inches, the drain hole shall not be less than 1/4 inch in diameter.

(b) A safety valve for a steam boiler shall not be smaller than 1/2 inch unless the boiler and radiating surfaces consist of a self-contained unit. A safety valve shall not be larger than 4 1/2 inches. The inlet opening shall have an inside diameter equal to or greater than the seat diameter.

(c) The minimum relieving capacity of the valve or valves shall be governed by the capacity marking on the boiler.

(d)(1) The minimum valve capacity in pounds per hour shall be the greater of the valves determined by either of the following:

(A) Dividing the maximum BTUH output at the boiler nozzle obtained by the firing of any fuel for which the unit is installed by 1,000; or

(B) using the pounds of steam generated per hour per square foot of boiler heating surface as given in the following table:

|                                       | minimum pounds of steam per hour<br>per square foot of heating surface |                      |
|---------------------------------------|--|----------------------|
|                                       | Firetube<br>boilers  | Watertube<br>boilers |
| Boiler heating surface:               |  |                      |
| Hand-fired                            | 5  | 6                    |
| Stoker-fired                          | 7  | 6                    |
| Oil, gas, or pulverized<br>fuel-fired | 8  | 10                   |
| Waterwall heating surface:            |  |                      |
| Hand-fired                            | 8  | 8                    |
| Stoker-fired                          | 10   | 12                   |
| Oil, gas, or pulverized<br>fuel-fired | 14   | 16                   |

(2) When a boiler is fired only by gas with a heat value not in excess of 200 BTUH per cubic feet, the minimum safety valve or safety relief valve relieving capacity shall be based on the value given for hand-fired boilers above.

(3) The minimum safety valve or safety relief valve relieving capacity for electric boilers shall be 3 1/2 pounds per hour per kilowatt input.

(4) The amount of heating surface in a boiler shall be determined according to the provisions of ASME code section IV, paragraph HG-403.

(e) The safety valve capacity for each steam boiler shall be such that, with the fuel-burning equipment installed and operating at maximum capacity, the pressure cannot rise more than 5 psig above the maximum allowable working pressure.

(f) When operating conditions are changed or additional boiler heating surface is installed, the valve capacity shall be increased, if necessary, to meet the new conditions in accordance with subsection (e).

When additional valves are required, they may be installed on the outlet piping if there is no intervening valve.

(g) If there is any doubt as to the capacity of the safety valve, an accumulation test shall be run in accordance with the ASME code, section VI.

(h) No valve of any description shall be placed between the safety valve and the boiler nor on the discharge pipe between the safety valve and the atmosphere. The safety valve shall be installed in a vertical position.

(i) The discharge pipe shall be at least full size and shall be fitted with an open drain to prevent water lodging in the upper part of the safety valve or in the discharge pipe. When an elbow is placed on the safety valve discharge pipe, the elbow shall be located close to the safety valve outlet, or the discharge pipe shall be securely anchored and supported. All safety valve discharges shall be located or piped in a manner that will not endanger persons working in the area. When discharge piping is directed downward, the pipe shall terminate six inches above floor level. Plastic discharge piping shall not be used.

(j) When two or more safety valve discharge lines are connected together, the cross-sectional area of the common discharge line shall equal or exceed the cross-sectional area of the combined safety valve discharge outlets. (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective May 1, 1987; amended April 28, 2000.)

**49-52-6 Safety relief valve requirements for hot water boilers.** (a)(1) Each hot water heating boiler shall have at least one ASME or national board certified safety relief valve set to relieve at or below the maximum allowable working pressure of the boiler. Each hot water supply boiler of the water tube or coil type shall have at least one ASME or national board-approved and certified safety relief valve of the automatic reseating type set to relieve at or below maximum allowable working pressure of the boiler. Safety relief valves that are ASME or national board certified as to capacity shall have pop action when tested by steam.

(2) When more than one safety relief valve is used on either hot water heating or hot water supply boilers, the additional valve or valves shall be ASME rated. The additional valves shall be set not to exceed the maximum allowable working pressure of the vessel.

(3) Safety relief valves shall be spring loaded. Safety relief valves shall be arranged so that they cannot be reset at a higher pressure than the maximum allowable working pressure of the boiler or pressure vessel.

(b) Materials that may fail due to deterioration or vulcanization when subject to saturated steam temperatures corresponding to the maximum capacity test pressure shall not be used.

(c) A safety relief valve shall not be smaller than 3/4 inch or larger than 4 1/2 inches standard pipe size, except that boilers having a heat input not greater than 15,000 BTUH may be equipped with a safety relief valve of 1/2 inch standard pipe size. The inlet opening shall have an inside diameter approximately equal to or greater than the seat diameter. The minimum opening through any part of the valve shall not be less than 1/2 inch in diameter or its equivalent area.

(d) The steam-relieving capacity, in pounds per hour, of the pressure-relieving device or devices on a boiler shall be the greater of that determined by either of the following methods:

(1) Dividing the maximum output in BTUH at the boiler nozzle obtained by the firing of any fuel for which the unit is installed by 1,000; or

(2) using the pounds of steam generated per hour per square foot of boiler heating surface as given in the table in K.A.R. 49-52-5 (d)(1).

(e) When operating conditions are changed or additional boiler heating surface is installed, the valve capacity shall be increased, if necessary, to meet the new conditions in accordance with K.A.R. 49-52-6(f). The additional valves required because of changed conditions may be installed on the outlet piping if there is no intervening valve.

(f) Safety relief valve capacity for each boiler shall be such that, with the fuel-burning equipment

installed and operated at maximum capacity, the pressure cannot rise more than 5 psig above the maximum allowable working pressure. Storage water heaters or boilers shall have T & P relief valves with a relieving capacity and an American gas association rating equal to or exceeding the burner BTUH input or electrical power kilowatt input.

(g)(1) The safety relief valve shall be installed in a vertical position, except for T & P relief valves on storage water heaters equipped with side tapings to accommodate the insertion of the T & P valve thermostat. The valve thermostat shall be immersed in the water and located in the top six inches of the vessel. No valve of any description shall be placed between the safety relief valve and the boiler or on the discharge pipe between the safety relief valve and the atmosphere.

(2) The discharge pipe shall be at least full size and fitted with an open drain to prevent water lodging in the upper part of the safety relief valve or in the discharge pipe. Horizontal discharge piping that provides adequate gravity drainage shall not normally require the fitting of an open drain. When an elbow is placed on the safety relief valve discharge pipe, the elbow shall be located close to the safety relief valve outlet or the discharge pipe shall be securely anchored and supported.

(3) All safety relief valve discharges shall be located or piped in a manner that does not endanger persons working in the area. When discharge piping is directed downward, the pipe shall terminate within six inches above floor level. Plastic discharge piping shall not be used on any safety relief valve discharge line, including all sizes of domestic hot water heaters.

(4) When two or more safety relief valve discharge lines are connected together, the cross-sectional area of the common discharge line shall equal or exceed the cross-sectional area of the combined safety relief valve outlets. (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective May 1, 1987; amended April 28, 2000.)

**49-52-7 Steam gauges.** (a) Each steam boiler shall have a steam gauge connected to its water column or a steam connection by means of a siphon or equivalent device exterior to the boiler. The siphon shall be of sufficient capacity to keep the gauge tube filled with water and shall be arranged so that the gauge cannot be shut off from the boiler except by a cock with tee or lever handle placed in the pipe near the gauge. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

(b) The scale on the dial of a steam gauge shall be graduated to not less than 30 psig or more than 3 1/2 times the maximum allowable working pressure. The gauge shall be provided with effective stops for the indicating pointer at the zero point and at the maximum pressure point. The pointer shall travel at least three inches from the zero to 30 psig pressure mark. (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective May 1, 1987; amended April 28, 2000.)

**49-52-8 Pressure or altitude gauge and thermometers.** (a) Each hot water boiler shall have a pressure or altitude gauge connected to it or to its flow connection in such a manner that it cannot be shut off from the boiler except by a cock with tee or lever handle placed on the pipe near the gauge. The handle of the cock shall be parallel to the pipe in which it is located when the cock is open.

(b) The scale on the dial of the pressure or altitude gauge shall display approximate graduation to not less than 1 1/2 or more than three times the maximum allowable working pressure.

(c) Piping or tubing for pressure altitude gauge connections shall be of nonferrous metal when smaller than one inch of pipe size.

(d) Each hot water boiler shall have a thermometer that is located and connected in such a manner that both of the following conditions are met:

(1) The thermometer is easily readable during observation of the water pressure or altitude gauge,

(2) The thermometer will at all times indicate the temperature, in degrees Fahrenheit, of the water in the boiler at or near the outlet.

(e) Each hot water supply boiler shall have a thermometer installed in the hot water supply line. (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective May 1, 1987; amended April 28,

2000.)

**49-52-9 Water gauge glasses.** (a) Each steam boiler shall have one or more water gauge glasses attached to the water column or boiler by means of valved fittings. The lower fitting shall be provided with a drain valve of the straightway type with an opening not less than 1/4 inch in diameter to facilitate cleaning. Gauge glass replacement shall be possible while the boiler is under pressure.

(b) Transparent material, other than glass, may be used for the water gauge if the material has proven suitable for the pressure, temperature, and corrosive conditions encountered in service.

(c) Gauge glasses shall be installed to show a water level in the boiler at or above the lowest permissible level as defined by the manufacturer of the boiler, and the low water cutoffs shall be installed accordingly. (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective May 1, 1987; amended April 28, 2000.)

**49-52-11 Feedwater connections, automatic low water fuel cutoff, and water-feeding devices.** (a) Feedwater, makeup water, or water treatment materials shall be introduced into a boiler through the return piping system or through an independent feedwater connection that does not discharge against parts of the boiler exposed to direct radiant heat from the fire. Feedwater, makeup water, or water treatment materials shall not be introduced through openings or connections provided for any of the following:

(1) Inspection or cleaning

(2) safety valves or safety relief valves; or

(3) surface blowoff, or the water column, water gauge glass, pressure gauge, or temperature gauge.

(b) The feedwater pipe shall be provided with a check valve near the boiler and a stop valve or cock between the check valve and the boiler or return pipe system.

(c) Each automatically fired steam or vapor system boiler shall be equipped with an automatic low water fuel cutoff located in a manner that will automatically cut off the fuel supply when the surface of the water falls to the lowest safe water line. The boiler shall also have a secondary low water cutoff that will cut off the fuel supply and lock out the burner and shall be equipped with a manual reset. If a water-feeding device is installed, it shall be constructed so that the water inlet valve cannot feed water into the boiler through the float chamber. The inter-feeding device shall be located to supply requisite feedwater. The lowest safe water line shall not be lower than the lowest visible part of the water glass.

(d) A fuel or feedwater control device may be attached directly to a low pressure boiler on the tapped openings in low pressure boilers that are provided for attaching a water glass directly to the boiler. The connections between the boiler and the water glass shall be nonferrous tees or Y's of not less than 1/2 inch pipe size. The water glass shall be attached directly, and as closely as possible, to the boiler. The water glass fittings shall be attached to the straightway topping of the Y or T. The fuel cutoff or water feeding device shall be attached to the side outlet of the Y or T. The ends of all nipples shall be reamed to full-size diameter.

(e) Designs using a float and float bowl shall have a vertical, straight-away valve drainpipe at the lowest point in the water-equalizing pipe. The connections in this installation shall permit the bowl and the equalizing pipe to be flushed and the device tested. A low water fuel cutoff control device shall be installed in all hot water heating systems with inputs exceeding 400,000 BTUH. Blowdown valves and pipe attachments shall be a minimum of 3/4 inches.

(f) A low water fuel cutoff shall be installed on all hot water heating systems, including systems under 400,000 BTUH that are not exempted. The low water cutoff shall be a float type, flow switch, or probe type installed in the boiler or piping above the boiler.

(g) Low water cutoffs installed on all hot water heating boilers shall be installed above the boiler and shall be equipped with a manual rest, with no intervening valves between the boiler and the low water cutoff. (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective May 1, 1987; amended April 28, 2000.)

**49-52-13 Provisions for thermal expansion in hot water systems.** (a) All hot water heating systems incorporating hot water tanks or fluid relief columns shall be installed in a manner that will prevent freezing under normal operating conditions.

(b) Systems with open expansion tank. If the system is equipped with an open expansion tank, an indoor overflow from the upper portion of the expansion tank shall be provided in addition to an open vent. The indoor overflow shall be carried within the building to a suitable plumbing fixture or the basement.

(c) Closed systems. If the system is closed, an airtight tank or other suitable air cushion shall be installed that will be consistent with the volume and capacity of the system, and it shall be suitably designed for a hydrostatic test pressure of 2 1/2 times the allowable working pressure of the system. Expansion tanks for systems designed to operate above 30 psig shall be constructed in accordance with section VIII, division 1, as required by section IV of the ASME code. Provisions shall be made to drain the tank without emptying the system, except for pre-pressurized tanks.

(d) Non-code expansion tanks installed on hot water heating systems shall be restricted to no more than 30 psi working pressure. (Authorized by and implementing K.S.A. 1985 Supp. 44-916; effective May 1, 1987; amended April 28, 2000.)

**49-52-14 Repairs and renewals of fittings and appliances.**

(a) Whenever repairs are made to fittings or appliances or it becomes necessary to replace them, the repairs shall comply with the following:

- (1) Sections I, IV, and VIII of the ASME code for new construction
- (2) the provisions of ASME CSD-1
- (3) NFPA 8501, 8502, 8503, 8504, 8505, and 8506; and
- (4) the national board inspection code.

(b) All electrical controls and safety devices shall bear a label and be listed by a nationally recognized agency, including UL (underwriters laboratories), FM (factory mutual), or AGA (American gas association). (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective May 1, 1987; amended April 28, 2000.)

**49-52-15** (Authorized by and implementing K.S.A. 1985 Supp. 44-916; effective May 1, 1987; revoked April 28, 2000.)

**49-52-16 Provisions for thermal expansion in hot water supply systems.** If the system is equipped with a check valve or pressure-reducing valve in the cold water inlet line, an airtight expansion tank or other suitable air cushion shall be used. If provided, the tank shall be constructed according to the requirements of section VIII, division 1 of the ASME code, with a maximum allowable working pressure to equal or exceed the working pressure of the hot water supply boiler. (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective April 28, 2000.)

**49-52-17 Emergency shutoff switches.** Emergency shutoff switches shall be installed on all hot water supply boilers and boilers of any size that are equipped with power burners, and on units with a BTUH input of 400,000 and over, regardless of burner type. All heating and power boilers shall have an emergency shutdown switch installed by each exit to meet the requirements of the national electrical code handbook, 1999 edition, which is adopted by reference, and CSD-1. Boilers with an input of 12,500,000 BTUH and over shall meet the requirements of NFPA 70, 1999 edition, which is adopted by reference, and NFPA 8501 through 8506. (Authorized by and implementing K.S.A. 1998 Supp. 44-916; effective April 28, 2000.)